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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,581	04/14/2004	Arie Ben-Bassat	CL2371 USNA	7161
23906 7590 06/18/2007 E I DU PONT DE NEMOURS AND COMPANY LEGAL PATENT RECORDS CENTER BARLEY MILL PLAZA 25/1128 4417 LANCASTER PIKE WILMINGTON, DE 19805			EXAMINER RAMIREZ, DELIA M	
			ART UNIT 1652	PAPER NUMBER
			MAIL DATE 06/18/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/824,581

**Applicant(s)**

BEN-BASSAT ET AL.

**Examiner**

Delia M. Ramirez

**Art Unit**

1652

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,8-23,30-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 17-23 and 30-40 is/are allowed.
- 6) ☒ Claim(s) 1 and 8-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Status of the Application***

Claims 1, 8-23, 30-40 are pending.

Applicant's amendment of claims 1, 17, 20, 38-40 as submitted in a communication filed on 3/27/2007 is acknowledged.

Claims 1, 8-23 and 30-40 are at issue and are being examined herein. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn.

***Terminal Disclaimer***

1. The terminal disclaimer filed on 3/27/2007 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of any patent granted on Application Number 10/439,478 has been reviewed and is accepted. The terminal disclaimer has been recorded.

***Claim Objections***

2. Applicant has indicated that in view of the lack of disclosure in the Office action mailed on 12/5/2006 as to why claims 15, 16, 20, 24, 26-28, 30-37 were objected, Applicant has been unable to address or respond to the objections. It is noted that the reasons why these claims were objected was not explicitly indicated in the previous Office action in view of the fact the only ground(s) of objection for these claims was their dependence upon a rejected base claim.

***Claim Rejections - 35 USC § 103***

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

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4. Claims 1, 8-14 remain rejected and claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cavin et al. (Applied and Environmental Microbiology 64(4):1466-1471, 1998) in view of Lee et al. (Enzyme and Microbial Technology 23:261-266, 1998; cited in the IDS and the specification).

5. This rejection as it relates to claims 1, 8-14 has been extensively discussed in the Non Final action mailed on 12/5/2006. It is now applied to claims 15-16 for the reasons of record and those set forth below.

6. Applicant submits that claim 1 has been amended to include the additional limitation contained in now canceled claim 2, which requires the enzyme source to be cell-free extract, partially purified enzyme, or purified enzyme. Applicant argues that Lee et al. explicitly teach whole cells and do not contemplate using a cell-free extract, partially purified enzyme or purified enzyme. Applicant also asserts that Lee et al. teach away from the use of cell-free extracts or purified enzyme since Lee et al. teach that a two phase aqueous-organic reaction system was developed to remove product and enhance vinylguaiacol synthesis in view of the fact that ferulate decarboxylase is subject to substrate and product inhibition. Applicant also submits that it was unexpectedly discovered that a higher yield of para-hydroxystyrene was achieved by using a cell-free extract/partially purified enzyme/purified enzyme.

7. Applicant's arguments have been fully considered but are not deemed persuasive to overcome the rejection of claims 1, 8-14 or avoid the rejection of claims 15-16. The Examiner acknowledges that Lee et al. teach whole cells and do not teach using a cell-free extract, partially purified enzyme or purified enzyme. However, the Examiner disagrees with Applicant's contention that Lee et al. teach away from using a cell-free extract, partially purified enzyme or purified enzyme. The statement of Lee et al. cited by Applicant while indicating that the justification for using a two-phase system is the fact that the enzyme is subject to both substrate and product inhibition, does not in any way teach away from using a cell-free extract, partially purified enzyme or purified enzyme. Nowhere in the reference is there a statement

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indicating that whole cells are preferred sources for the enzyme or that this substrate/product inhibition does not occur when the enzyme source is a whole cell. In fact, Lee et al. teach that whole-cell ferulic acid decarboxylation is subject to substrate inhibition as observed with the purified enzyme (page 264, left column, Optimization of vinylguaiacol synthesis in phosphate buffer: hexane). It is noted that while not explicitly indicated by Lee et al., the use of purified enzyme appears to be suggested in view of the fact that Lee et al. teach that (1) the stability of the enzyme in the cells is similar to that observed with purified enzyme (page 265, left column, Influence of temperature on vinylguaiacol synthesis in a two-phase batch reaction), and (2) viscosity of whole cells appears to limit transport of substrate/product and limits yield (page 264, last paragraph, left column). Thus, contrary to Applicant's assertions, the teachings of Lee et al. do not teach away from using cell-free extract, partially purified enzyme or purified enzyme. While one could agree that the use of whole cells is advantageous as there is no need to purify the enzyme, as evidenced by Lee et al., there are advantages in the use of purified enzyme versus whole cells as cell viscosity would not be an issue in a cell-free system.

With regard to arguments that Applicant unexpectedly discovered higher yields when a cell-free extract, partially purified enzyme or purified enzyme was used, it is noted that (1) the teachings of Lee et al. regarding limitations in yield due to cell viscosity appear to suggest that higher yields could be obtained with a purified enzyme, and (2) the claims as amended do not require a yield which is higher than that obtained with a method which uses whole cells. The claims only require the production of para-hydroxystyrene. In view of the teachings of Lee et al. previously discussed, there is a reasonable expectation of success at producing para-hydroxystyrene using the enzyme of Cavin et al. Thus, for the reasons extensively discussed in the Non Final action mailed on 12/5/2006 and those set forth above, the claimed invention remains obvious to a person of ordinary skill in the art in view of the teachings of Cavin et al. and Lee et al.

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With regard to claims 15-16, these claims are directed to the method of claim 1 wherein the extractant or the aqueous phase are optionally added back to the biphasic reaction medium. It would have been obvious to one of ordinary skill in the art at the time the invention was made to further recycle the extractant and/or aqueous phases in the method of Cavin et al. and Lee et al. A person of ordinary skill in the art is motivated to recycle the aqueous phase for the benefit of reusing the enzyme which is present in the aqueous phase and also to avoid increasing the amount of industrial waste generated by the process. As known in the art, recycling of the enzyme is highly desirable in view of the high cost associated with replenishing the enzyme at an industrial scale. Also, a person of ordinary skill in the art is motivated to recycle the extractant to avoid generating additional hydrocarbon-containing industrial waste. One of skill in the art has a reasonable expectation of success at recycling the extractant and aqueous phases in view of the fact that methods to separate organic and aqueous phases for recycling, such as centrifugation and gravity settling, are well known in the art, as admitted by Applicant in the specification (page 23, lines 16-38). Therefore, the invention as a whole would have been prima facie obvious to a person of ordinary skill in the art at the time the invention was made.

#### ***Double Patenting***

8. Claims 1-2, 4-14 were provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-14, 17-19 of copending Application No. 10/439478 in view of Lee et al. (Enzyme and Microbial Technology 23:261-266, 1998; cited in the IDS and the specification). In view of Applicant's submission of a proper terminal disclaimer disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of any patent granted on Application Number 10/439,478, this rejection is hereby withdrawn.

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*Allowable Subject Matter*

9. Claims 17-23, 30-40 appear to be allowable over the prior art of record.

*Conclusion*

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PMR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Delia M. Ramirez whose telephone number is (571) 272-0938. The examiner can normally be reached on Monday-Friday from 8:30 AM to 5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Ponnathapura Achutamurthy can be reached on (571) 272-0928. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-1600.



Delia M. Ramirez, Ph.D.  
Primary Patent Examiner  
Art Unit 1652

DR  
June 4, 2007